

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Atlanta, Ga.	25	50	w.	Nantucket, Mass.	26	61	e.
Do.	26	50	nw.	New York, N. Y.	25	56	ne.
Block Island, R. I.	26	50	nw.	Do.	26	58	ne.
Do.	26	72	ne.	North Head, Wash.	1	52	nw.
Buffalo, N. Y.	5	56	sw.	Do.	2	56	nw.
Do.	6	54	sw.	Do.	8	52	sw.
Do.	7	72	w.	Do.	9	64	se.
Do.	8	50	w.	Do.	11	72	se.
Do.	13	52	sw.	Do.	12	66	s.
Do.	14	60	sw.	Do.	29	50	s.
Burlington, Vt.	14	50	se.	Do.	12	52	se.
Chicago, Ill.	5	52	sw.	Pensacola, Fla.	7	69	w.
Cleveland, Ohio.	5	51	s.	Pittsburg, Pa.	1	66	nw.
Detroit, Mich.	5	56	sw.	Point Reyes Light, Cal.	1	75	nw.
Do.	7	52	w.	Do.	2	75	nw.
Eastport, Me.	14	66	e.	Do.	4	78	s.
Do.	26	50	ne.	Do.	5	51	nw.
Erie, Pa.	13	55	se.	Do.	6	64	s.
Grand Haven, Mich.	5	52	sw.	Do.	8	66	s.
Grand Rapids, Mich.	5	52	sw.	Do.	9	50	nw.
Hatteras, N. C.	25	58	w.	Do.	31	52	nw.
Do.	26	54	w.	Port Huron, Mich.	5	50	sw.
Modena, Utah.	9	50	sw.	Portland, Me.	14	54	se.
Do.	31	51	s.	Savannah, Ga.	25	52	w.
Mount Tamalpais, Cal.	1	50	nw.	Sioux City, Iowa.	16	50	nw.
Do.	2	62	nw.	Southeast Farallon, Cal.	1	55	nw.
Do.	3	50	n.	Do.	2	59	nw.
Do.	6	54	se.	Do.	4	62	sw.
Do.	8	52	sw.	Do.	6	67	s.
Do.	9	62	nw.	Do.	8	52	s.
Mount Weather, Va.	7	63	nw.	Tatoosh Island, Wash.	4	72	ne.
Do.	8	50	nw.	Do.	6	86	e.
Do.	22	56	nw.	Do.	7	80	e.
Do.	23	66	nw.	Do.	8	64	e.
Do.	26	73	nw.	Do.	9	56	s.
Do.	29	64	nw.	Do.	10	53	sw.
Do.	30	53	nw.	Do.	11	50	s.
Nantucket, Mass.	14	50	se.	Topeka, Kans.	5	55	sw.

RAINFALL IN JAMAICA.

Through the kindness of Mr. Maxwell Hall, meteorologist to the government of Jamaica and now in charge of the meteorological service of that island, we have received the following data:

Comparative table of rainfall.

[Based upon the average stations only.]
DECEMBER, 1909.

Divisions.	Relative area.	Number of stations.	Rainfall	
			1909.	Average.
			Inches.	Inches.
Northeastern division	25	17	2.22	9.96
Northern division	23	41	2.59	5.88
West-central division	26	20	1.48	3.67
Southern division	27	26	0.62	2.74
Means	100		1.73	5.56

The rainfall over the island was remarkably small, being only one-third of the average. The greatest rainfall, 10.27 inches, was recorded at Green Vale, in Portland, and no rainfall occurred at several stations in the southern division.

General summary for the year 1909.

[From about 110 "average" stations.]

Month.	NE.	N.	W.-C.	S.	The island.
	Inches.	Inches.	Inches.	Inches.	Inches.
1909.					
January	8.78	4.08	2.07	2.50	4.35
February	2.75	0.77	1.76	1.24	1.63
March	3.83	2.36	3.76	1.52	2.87
April	4.19	1.47	5.03	3.88	3.64
May	6.15	5.75	11.31	4.13	6.84
June	4.98	5.22	9.46	6.01	6.42
July	4.78	3.40	8.44	5.45	5.52
August	8.60	6.15	10.78	7.03	8.14
September	15.18	12.70	19.45	16.50	15.96
October	13.13	7.88	14.08	12.32	11.85
November	38.07	13.66	14.24	18.92	21.22
December	2.22	2.59	1.48	0.62	1.73
Total	112.66	66.03	101.84	80.12	90.17

RIVERS AND FLOODS.

The principal floods of the month occurred in Oregon and Washington, reaching their height during the last week of November, but continuing during the first few days of December. Those in the Willamette watershed in the State of Oregon were caused by persistent heavy rains from November 17 to 24, inclusive, and were almost entirely rain floods, as there was but little snow in the mountains. There had, however, been frequent and substantial rains during the first half of the month, and these so saturated the soil that practically all of the succeeding rains ran into the rivers. These later rains from November 17 to 24, inclusive, averaged about 80 per cent of the normal amount for the entire month of November, and were sufficient in themselves to cause an ordinary flood. The first preliminary advices and warnings were issued on November 22, when the rise first set in, and were continued daily until November 29, when announcement was made that the Willamette River was falling at all points, and that the rain then falling would not be sufficient to check the fall. The warnings were very successful, the crest stages reached differing but slightly from those forecast. At Salem, Oreg., the crest stage on November 25 was 30.7 feet, 10.7 feet above the flood stage, and the highest recorded stage, the record extending back to the year 1891, while at Portland the crest stage of 22.3 feet on November 26 was 7.3 feet above the flood stage, and the highest November stage of record. The following table shows the crest stages at the different stations and the times of their occurrence.

This flood occurred at a time of year when there were no growing crops, and the losses and damage were consequently very much less than would have resulted at another season. Lowlands were flooded generally, but the sedimentary deposits

were, as usual along rivers of this character, very beneficial to the lands. Some hops were waterlogged, a few bridges were carried away, and some mills were obliged to close, but it is doubtful whether the total losses from the flood amounted to more than \$200,000. The data regarding this flood were furnished by Mr. H. J. Andree of the Local Office of the Weather Bureau at Portland, Oreg.

Station.	River.	Flood stage.	Highest stage.	Date.
Eugene	Willamette	10	21.5	Nov. 23, 12:00 noon.
Harrisburg	do.	7	14.8	Nov. 23, 3:00 p. m.
Albany	do.	20	31.0	Nov. 24, 3:00 p. m.
Jefferson	Santiam	10	17.0	Nov. 23, 8:00 a. m.
Salem	Willamette	30	30.7	Nov. 25, 5:00 a. m.
McMinnville	Yamhill	35	39.0	Nov. 24, 9:00 a. m.
Wilsonville	Willamette	37	39.5	Nov. 25, 8:00 a. m.
Tualatin	Tualatin	15	9.7	Nov. 25, 8:00 a. m.
Portland	Willamette	15	22.3	Nov. 26, 1:00 p. m.

In the State of Washington the floods occurred in the small, but swift flowing streams that head in the Olympic Mountains, the rivers on both sides of the Cascade Mountains, and the Chehalis and Willapa rivers that head in the coast range and flow directly into the Pacific Ocean. The floods were caused by a combination of the heaviest November rainfalls on record, and warm winds that melted the snow fields at the headwaters of the streams. The rainfall was almost continuous, except for a few days about the middle of the month, and all the rivers were in flood, some of them reaching stages higher than ever before recorded. No details were available for the rivers in the northwestern part of the State, but the cooperative observers of the Weather Bureau agreed in the general statement that the floods were the greatest that had

occurred since they had lived in that section. In other sections there were the usual reports of damage to railroads, bridges, farm lands, live stock, grain, etc. The greatest damage appears to have been done along the Skagit and Chehalis rivers, but an accurate estimate of the total amount is impossible.

The losses along the Skagit River alone amounted to over \$1,000,000, and those along the Chehalis to about half as much. Roughly speaking the total losses could not have been less than \$4,000,000.

The data regarding the Washington floods were furnished by Mr. G. N. Salisbury, Section Director in charge of the Local Office of the Weather Bureau at Seattle, Wash.

During the first week of the month there were frequent and heavy rains over the Sacramento and lower San Joaquin watersheds and flood stages were nearly reached in the main rivers. At Red Bluff, Cal., the crest stage on December 9 was 22.4 feet, 0.6 foot below the flood stage; at Colusa, Cal., on December 10, 23.5 feet, 4.5 feet below the flood stage, and at Sacramento, Cal., on December 9, 24 feet, 1 foot below the flood stages for places outside the city. Warnings were first issued on December 8, and no reports of damage have been received.

There were no other floods reported and over the great rivers of the country seasonable stages prevailed.

ICE.

At the end of the month the Missouri River was closed as far

south as the mouth of the Platte River, and there were also small gorges in the vicinity of Kansas City from December 17 to 25, inclusive. The Mississippi River was frozen as far south as the mouth of the Des Moines River, closing on December 6 at St. Paul, Minn., and on December 26 at Keokuk, Iowa. Heavy ice passed St. Louis beginning with December 10, a gorge forming on December 22, 1 mile above Chester, Ill., and on December 29 at St. Louis, continuing at the close of the month. No ice of consequence reached as far south as Memphis, Tenn.

The Ohio River was full of ice during the last half of the month and numerous gorges formed during the last few days as far down as the mouth of the Wabash River. The upper Monongahela and the Kiskiminetas rivers closed on December 20, and the Allegheny at Freeport, Pa., on December 21. The Connecticut River closed at Wells River, Vt., on December 10, at White River Junction, Vt., on December 28, and at Bellows Falls, Vt., on December 29. The Penobscot River at Mattawamkeag, Me., did not close until December 25.

Hydrographs for typical points on several principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—H. C. Frankenfield, Professor of Meteorology.

SPECIAL PAPERS ON GENERAL METEOROLOGY.

RECENT PAPERS BEARING ON METEOROLOGY AND SEISMOLOGY.

C. FITZHUGH TALMAN, Librarian.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a —.

Engineering news. New York. v. 62. December 9, 1910.

— The problem of flood protection. p. 644-645.

— Flood prevention and land fertilization by basin irrigation in the Sacramento-San Joaquin valley. p. 647-648.

Nature. London. v. 88. February 3, 1910.

— Sir Charles Todd, K. C. M. G., F. R. S. p. 403.

Physical review. Lancaster. v. 30. February, 1910.

Thomson, A. On the relative number of positive and negative ions present in atmospheric air. p. 288-289. [Abstract.]

Strong, W. W. Thunderstorm electricity. 290-291. [Abstract.]

Popular science monthly. New York. v. 76. March, 1910.

Ward, Robert DeC. Climate in some of its relations to man. p. 246-268.

Royal society of Edinburgh. Proceedings. Edinburgh. v. 30, pt. 1. 1909-1910.

Knott, C. G. Seismic radiations. p. 25-37.

Science. New York. v. 31. 1910.

Varney, B. M. Mountain and valley winds in the Canadian Selkirk. p. 192-193. (Feb. 4.)

Humphreys, W. J. Some suggestions for the study of comets. p. 226-230. [Suggests meteorological phenomena to be observed.] (Feb. 11.)

Varney, B. M. Some long-period deviations of the horizontal pendulums at the Harvard seismographic station. p. 230-232. (Feb. 11.)

Hobbs, Wm. H. A national bureau of seismology. p. 260. (Feb. 18.)

Scientific American. New York. v. 102. Feb. 19, 1910.

— The great flood of Paris. p. 164. [Illustrated.]

Scottish geographical magazine. Edinburgh. v. 26. February, 1910.

Wedderburn, W. S. The temperature seiche. p. 83-86.

Scottish meteorological society. Journal. Edinburgh. v. 15. 1909.

Balfour, Frances, & Omond, R. T. Sir Arthur Mitchell, K. C. B. p. 3-8. [With portrait.]

Begg, John S. The influence of topographical conditions upon the east of Scotland. p. 9-15.

Innes, R. T. A. Meteorology in the Transvaal. p. 16-23. [Illustrated.]

Wood, H. E. The intensity distribution of rainfall over the Witwatersrand. p. 24-29.

Watt, Andrew. The exploration of the upper air. p. 30-41.

— The study of weather knowledge in schools. p. 42-43.

— The new observatory on Eskdalemuir. p. 44-45.

Symons's meteorological magazine. London. v. 45. February, 1910.

— Proposed imperial meteorological organization. p. 1-4.

Ciel et terre. Bruxelles. 30 année. 1 février 1910.

Walravens, A. La sécheresse de l'air à l'intérieur des habitations. p. 549-553.

W., A. Quelques problèmes d'hygrométrie. p. 553-560.

L., E. Ole Römer et le thermomètre Fahrenheit. p. 560-562.

Nature. Paris. 38 année. 1910.

Lemoine, Paul. Les crues de la Seine. p. 145-156. [Illustrated.] (5 fév.)

Guillaume, Ch. Ed. Les unités de la météorologie. p. 158-159. (5 fév.)

Loisel, J. Le givre et la neige. p. 183-186. [Illustrated.] (19 fév.)

Revue néphologique. Mons. Tome 4. Janvier 1910.

Le téléanémographe Masereel. p. 389.

Physikalische Zeitschrift. Leipzig. 11. Jahrgang. 1. Februar 1910.

Bateman, H. Die Lösung der Integralgleichung, welche die Fortpflanzungsgeschwindigkeit einer Erdbebenwelle am Innern der Erde mit den Zeiten verbindet, die die Störung gebraucht um zu verschiedenen Stationen auf der Erdoberfläche zu gelangen. p. 96-99.

Wetter. Berlin. 27. Jahrgang. Januar 1910.

Scheibel, —. Die feste Eisdicke, der Eisaufbruch, Eisgang und die damit verbundenen Eisversetzungen auf Flüssen und Strömen. p. 2-9.

Dreis, J. Über die Beobachtungen der Gewitter. p. 14-18.

— Die Forelle als Wetterprophet. p. 18-19.

Schultheiss, —. Der Wetterdienst in Baden. p. 20-24.

Wiener Luftschiffer-Zeitung. Wien. 9. Jahrgang. 1. Februar 1910.

Broichsitter, Heinrich. Über Windmessapparate. p. 43-44.

Hemel en dampkring. Den Haag. 7. Jaargang. Januari 1910.

— De bepaling van de ontwikkeling der halo's. p. 135-139.

RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.

C. FITZHUGH TALMAN, Librarian.

The following have been selected from among the titles of books recently received, as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies. Most of them can be lent for a limited time